

Claims

- [c1] 1. A process for removing SO_2 , NO, and NO_2 from a gas stream comprising the steps of
 - a. oxidizing at least a portion of NO in a gas stream to NO_2 with an oxidizing means resulting in a mole ratio of SO_2 to NO_2 of at least 2.5 to 1, followed by
 - b. scrubbing at least a portion of SO_2 , NO, and NO_2 from the gas stream with a scrubbing solution comprising ammonia, and having a pH between 6 and 8, and
 - c. removing at least a portion of any ammonia aerosols generated from the scrubbing step from the gas stream with an aerosol removal means.
- [c2] 2. The process of claim 1, wherein said oxidizing means is an electrical discharge reactor.
- [c3] 3. The process of claim 2, wherein said electrical discharge reactor is a dielectric barrier discharge reactor.
- [c4] 4. The process of claim 3, further comprising the step of oxidizing at least a portion of the NO to HNO_3 with said dielectric barrier discharge reactor.

- [c5] 5. The process of claim 1, wherein said oxidizing step is adapted to result in a mole ratio of SO_2 to NO_2 of at least four to one.
- [c6] 6. The process of claim 1, said scrubbing solution comprising ammonia, ammonium sulfite, ammonium sulfate, and water, and having a pH between 6 and 8.
- [c7] 7. The process of claim 1, wherein said aerosol removal means is a wet electrostatic precipitator.
- [c8] 8. The process of claim 1, wherein said scrubbing step results in the formation of ammonium sulfate, the process further comprising the step of withdrawing ammonium sulfate from the scrubbing solution.
- [c9] 9. The process of claim 4, wherein said scrubbing step results in the formation of ammonium nitrate, the process further comprising the step of withdrawing ammonium nitrate from the scrubbing solution.
- [c10] 10. A process for removing SO_2 , NO , NO_2 , and Hg from a gas stream comprising the steps of
 - a. oxidizing at least a portion of the NO in a gas stream to NO_2 , and at least a portion of the Hg in a gas stream to HgO , with an oxidizing means, followed by
 - b. scrubbing at least a portion of the SO_2 , NO , and NO_2

from the gas stream with a scrubbing solution comprising ammonia, and having a pH between 6 and 8, and

c. removing at least a portion of any ammonia aerosols generated from the scrubbing step, and HgO, from the gas stream with an aerosol removal means.

- [c11] 11. The process of claim 10, wherein said oxidizing means is an electrical discharge reactor.
- [c12] 12. The process of claim 11, wherein said electrical discharge reactor is a dielectric barrier discharge reactor.
- [c13] 13. The process of claim 10, wherein said aerosol removal means is a wet electrostatic precipitator.
- [c14] 14. The process of claim 10, said scrubbing solution comprising ammonia, ammonium sulfite, ammonium sulfate, and water, and having a pH between 6 and 8.
- [c15] 15. The process of claim 14, wherein said scrubbing step results in the formation of ammonium sulfate, the process further comprising the step of withdrawing ammonium sulfate from the scrubbing solution.